

Text of the Notification of the First Office Action

Application Number : 200310103500X

Title of the Invention : A Semiconductor Device and Method of Fabricating the Same

The present application relates to a semiconductor device and a method making same with 35 claims, wherein claims 1 and 23 are independent claims. After examination, the examiner put forward the following opinions.

1. The technical solution asked for protection in independent claim 1 does not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. Reference document 1 disclosed a technical solution as below (refer to the content from paragraph 1 of page 5 to paragraph 2 of page 6 of the description and Fig.1A): a semiconductor device comprising, a semiconductor substrate 11 having a plurality of connecting pads 13, two layers of insulating films 14 and 18 formed over the substrate 11 and a layer encapsulating film 22 on the top surface, openings 15 and 19 corresponding to the upper side of the connecting pads 13 forming a recess in which a connection pad section 17 and re-wiring 20 are successively formed on the upper surface of the connection pads 13,

and columnar electrodes 21 are formed on the upper surface of the re-wiring 20 (17, 20, 21 equivalent to the interconnections). It is obvious for a person skilled in the art to obtain the technical solution asked for protection in claim 1 on the basis of reference document 1, therefore, claim 1 does not possess inventiveness in that it does not have prominent substantive features or represent a notable progress.

2. The technical solution asked for protection in dependent claim 2 does not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. Reference document 1 disclosed the following technical features (refer to the same reference content as mentioned above): openings 15 and 19 are provided corresponding to the upper side of the connecting pads 13 forming a recess in which a connection pad section 17 and re-wiring 20 are successively formed on the upper surface of the connection pads 13, and columnar electrodes 21 are formed on the upper surface of the re-wiring 20. It is obvious for a person skilled in the art to obtain the technical solution asked for protection in claim 2 on the basis of reference document 1, therefore, claim 2 does not possess inventiveness for lacking prominent substantive features and a notable progress.

3. The technical solution asked for protection in dependent

claim 3 does not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. It is easy for a person skilled in the art to define spaces between the interconnection provided in the recess and the side surfaces of the recess, and this feature is a common knowledge in this field. It is obvious for a person skilled in the art to obtain the technical solution asked for protection in claim 3 by combining the common knowledge on the basis of reference document 1, therefore, claim 3 does not possess inventiveness for lacking prominent substantive features and a notable progress.

4. The technical solutions asked for protection in dependent claims 4, 5, 7 and 11 do not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. Reference document 1 disclosed (refer to the same content as mentioned above) the following technical features: a semiconductor substrate 11 having a plurality of connecting pads 13, two layer insulating films 14 and 18 (equivalent to the insulating film and the upper insulating film, respectively) formed over the substrate 11, wherein insulating films 14 is made of silicon oxide and insulating films 18 is made of polyimide, and a layer encapsulating film 22 on the top surface, openings 15 and 19 corresponding to the upper side of the connecting pads 13 forming a recess, in which recess a connection pad section 17 and re-wiring 20 are successively formed on the upper surface of the

connection pads 13, and columnar electrodes 21 are formed on the upper surface of the re-wiring 20, and encapsulating film 22 is formed between the columnar electrodes 21. It is obvious for a person skilled in the art to obtain the technical solutions asked for protection in claims 4, 5, 7 and 11 on the basis of reference document 1, therefore, claims 4, 5, 7 and 11 do not possess inventiveness for lacking prominent substantive features and a notable progress.

5. The technical solution asked for protection in dependent claim 6 does not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. It is a common knowledge for a person skilled in the art to make the two layers of insulating films with only one insulating material. It is obvious for a person skilled in the art to obtain the technical solution asked for protection in claim 6 by combining the common knowledge on the basis of reference document 1, therefore, claim 6 does not possess inventiveness for lacking prominent substantive features and a notable progress.

6. The technical solutions asked for protection in dependent claims 8-10 do not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. It is a common knowledge for a person skilled in the art to make the bump electrodes protrude from the encapsulating film or divide the bump electrodes into two sections

and make the lower bump electrode protrude from the encapsulating film. It is obvious for a person skilled in the art to obtain the technical solutions asked for protection in claims 8-10 by combining the common knowledge on the basis of reference document 1, therefore, claims 8-10 do not possess inventiveness for lacking prominent substantive features and a notable progress.

7. The technical solutions asked for protection in dependent claims 12 and 13 do not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. Reference document 1 disclosed (refer to the same content as mentioned above) the following technical features: the second insulating film 18 consists of polyimide, and it can be seen from Fig. 1B, the recess formed in the openings 15 and 19 has a depth larger than the thickness of the interconnections. It is obvious for a person skilled in the art to obtain the technical solutions asked for protection in claims 12 and 13 on the basis of reference document 1, therefore, claims 12 and 13 do not possess inventiveness for lacking prominent substantive features and a notable progress.

8. The technical solutions asked for protection in dependent claims 14-16 do not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. It is a common knowledge for a

person skilled in the art that in order to realize the insulation function of the insulating film and to enable the recess to contain the rewiring and at the same time avoid an oversize device, the insulating film and the recess should have a certain thickness and depth, and that the insulating film should have a certain thickness from the bottom surface of the recess. It is obvious for a person skilled in the art to obtain the technical solutions asked for protection in claims 14-16 by combining the common knowledge on the basis of reference document 1, therefore, claims 14-16 do not possess inventiveness for lacking prominent substantive features and a notable progress.

9. The technical solutions asked for protection in dependent claims 17 does not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. Reference document 1 disclosed (refer to the same content as mentioned above), as shown in Fig. 1B, that the rewiring 20 is formed on the upper surface of the insulating layer. It is obvious for a person skilled in the art to obtain the technical solution asked for protection in claim 17 on the basis of reference document 1, therefore, claim 17 do not possess inventiveness for lacking prominent substantive features and a notable progress.

10. The technical solution asked for protection in dependent

claim 18 does not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. It is easy for a person skilled in the art to make the substantially same intervals between the interconnections and the recess of the insulating film without an inventive work, and this feature is a common knowledge in this field. It is obvious for a person skilled in the art to obtain the technical solution asked for protection in claim 18 by combining the common knowledge on the basis of reference document 1, therefore, claim 18 does not possess inventiveness for lacking prominent substantive features and a notable progress.

11. The technical solutions asked for protection in dependent claims 19, 20 and 22 do not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. Reference document 1 disclosed the following technical features(refer to the same content as mentioned above): a semiconductor substrate 11 having a plurality of connecting pads 13, two layers of insulating films 14 and 18 (equivalent to the insulating film and the upper insulating film, respectively) being formed over the substrate 11, wherein insulating films 14 is made of silicon oxide and insulating films 18 are made of polyimide, and a layer of encapsulating film 22 being on the top surface, openings 15 and 19 corresponding to the upper side of the connecting pads 13 forming a recess in which a

connection pad section 17 and re-wiring 20 are successively formed on the upper surface of the connection pads 13, and columnar electrodes 21 are formed on the upper surface of the re-wiring 20, and encapsulating film 22 is formed between the columnar electrodes 21. It is obvious for a person skilled in the art to obtain the technical solutions asked for protection in claims 19, 20 and 22 on the basis of reference document 1, therefore, claims 19, 20 and 22 do not possess inventiveness for lacking prominent substantive features and a notable progress.

12. The technical solution asked for protection in dependent claim 21 does not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. It is a common knowledge for a person skilled in the art to make the two layer insulating films by using an insulating material containing the same main component. It is obvious for a person skilled in the art to obtain the technical solution asked for protection in claim 21 by combining the common knowledge on the basis of reference document 1, therefore, claim 21 does not possess inventiveness for lacking prominent substantive features and a notable progress.

13. The technical solution asked for protection in independent claim 23 does not possess inventiveness prescribed in Paragraph 3,



Article 22 of the Chinese Patent Law. Reference document 1 disclosed a technical solution as below (refer to the content from paragraph 1 of page 5 to paragraph 2 of page 6 of the description and Fig.1A): a semiconductor device comprising, a semiconductor substrate 11 having a plurality of connecting pads 13, two layers of insulating films 14 and 18 formed over the substrate 11 and a layer encapsulating film 22 on the top surface, openings 15 and 19 corresponding to the upper side of the connecting pads 13 forming a recess, in which recess a connection pad section 17 and re-wiring 20 are successively formed on the upper surface of the connection pads 13, and columnar electrodes 21 is formed on the upper surface of the re-wiring 20 (17, 20, 21 equivalent to the interconnections). It is obvious for a person skilled in the art to obtain the technical solution asked for protection in claim 1 on the basis of reference document 1, therefore, claim 1 does not possess inventiveness for lacking prominent substantive features and a notable progress.

14. The technical solutions asked for protection in dependent claims 24 and 26 do not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. Reference document 1 disclosed (refer to the same content as mentioned above) the following technical features: a semiconductor substrate 11 having a plurality of connecting pads 13, two layer insulating films 14 and 18

(equivalent to the insulating film and the upper insulating film, respectively) formed over the substrate 11, wherein insulating films 14 is made of silicon oxide and insulating films 18 is made of polyimide, and a layer encapsulating film 22 on the top surface, openings 15 and 19 corresponding to the upper side of the connecting pads 13 forming a recess, in which recess a connection pad section 17 and re-wiring 20 are successively formed on the upper surface of the connection pads 13, and columnar electrodes 21 are formed on the upper surface of the re-wiring 20, and encapsulating film 22 is formed between the columnar electrodes 21. It is obvious for a person skilled in the art to obtain the technical solutions asked for protection in claims 24 and 26 on the basis of reference document 1, therefore, claims 24 and 26 do not possess inventiveness for lacking prominent substantive features and a notable progress.

15. The technical solutions asked for protection in dependent claim 25 does not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. Reference document 1 disclosed (refer to the same content as mentioned above) the following technical features: it can be seen from Fig. 1B, the recess formed in the openings 15 and 19 has a depth larger than the thickness of the interconnection. It is obvious for a person skilled in

the art to obtain the technical solutions asked for protection in claim

25 on the basis of reference document 1, therefore, claim 25 does not possess inventiveness for lacking prominent substantive features and a notable progress.

16. The technical solution asked for protection in dependent claim 27 does not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. It is a common knowledge for a person skilled in the art to form a solder ball on an upper surface of each bump electrode for the welding between other elements in the subsequent working procedures. It is obvious for a person skilled in the art to obtain the technical solution asked for protection in claim 27 by combining the common knowledge on the basis of reference document 1, therefore, claim 27 does not possess inventiveness for lacking prominent substantive features and a notable progress.

17. The technical solutions asked for protection in dependent claim 28 does not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. Reference document 1 disclosed (refer to the same content as mentioned above) the following technical features: a semiconductor substrate 11 having a plurality of connecting pads 13, two layer insulating films 14 and 18 (equivalent to the insulating film and the upper insulating film, respectively) formed over the substrate 11. It is obvious for a person

skilled in the art to obtain the technical solution asked for protection in claim 28 by combining the common knowledge on the basis of reference document 1, therefore, claim 28 does not possess inventiveness for lacking prominent substantive features and a notable progress.

18. The technical solutions asked for protection in dependent claims 29 and 30 do not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. It is common knowledge for a person skilled in the art to make the bump electrodes protrude from the encapsulating film and divide the bump electrodes into two sections. It is obvious for a person skilled in the art to obtain the technical solutions asked for protection in claims 29 and 30 by combining the common knowledge on the basis of reference document 1, therefore, claims 29 and 30 do not possess inventiveness for lacking prominent substantive features and a notable progress.

19. The technical solutions asked for protection in dependent claims 31 and 32 do not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. It is easy for a person skilled in the art to form connecting lines connected to the interconnections on the insulating film, electroplate the lower bump electrodes to be leveled with the encapsulating film and form upper

bump electrodes on the lower bump electrodes by electroplating without an inventive work, and these features are common knowledge in this field. It is obvious for a person skilled in the art to obtain the technical solutions asked for protection in claims 31 and 32 by combining the common knowledge on the basis of reference document 1, therefore, claims 31 and 32 do not possess inventiveness for lacking prominent substantive features and a notable progress.

20. The technical solution asked for protection in dependent claim 33 does not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. Reference document 1 disclosed (refer to the same content as mentioned above) the following technical feature: rewiring 20 is formed on the second insulating film. It is obvious for a person skilled in the art to obtain the technical solution asked for protection in claim 33 by combining the common knowledge on the basis of reference document 1, therefore, claim 33 does not possess inventiveness for lacking prominent substantive features and a notable progress.

21. The technical solutions asked for protection in dependent claims 34 and 35 do not possess inventiveness prescribed in Paragraph 3, Article 22 of the Chinese Patent Law. It is easy for a person skilled in the art to form a recess by using the interconnections

as masks after the interconnections are firstly formed, and this feature is a common knowledge in this field. It is obvious for a person skilled in the art to obtain the technical solutions asked for protection in claims 34 and 35 by combining the common knowledge on the basis of reference document 1, therefore, claims 34 and 35 do not possess inventiveness for lacking prominent substantive features and a notable progress.

Based on the above reasons, all the independent claims and dependent claims do not possess inventiveness, meanwhile the specification does not contain any subject matter for which a patent right can be granted. Therefore, the application has no prospect of being granted a patent right even if the applicant amends the claims by recombining the original claims and /or further defining the claims in accordance with the contents of the specification. The application will be rejected if the applicant fails to state the reasons why the invention possesses inventiveness within the time limit specified in the notification.

Examiner : Wu Haitao

Code : A 119